01

Preoperative Recommendations

- Counsel patients on risks of cannabis use
- Consider taper if preop visit > 7 days
- Delay elective surgery if patient showing signs of acute intoxication or acute onset impairment of decision making related to cannabis intoxication
  - Do not recommend delay for non-acute use or to facilitate taper

02

Intraoperative Recommendations

- Consider increased level of anesthesia during induction and maintenance
- Consider processed EEG monitoring
- Increase PONV prophylaxis
- Consider 5-lead ECG monitoring for patients with additional risk factors
- Consider multimodal or regional anesthesia for pain management
  - No contraindications for any pain medications due to cannabis use
  - May inhibit some P450 enzymes, consider longer dosing intervals

03

Postoperative Recommendations

- Monitor for CWS signs and symptoms
- Consider early evaluation for neurological deficits
- Consider escalating postoperative analgesia requirements
- Reinforce education on the risks of significant cannabis use

Preoperative Recommendations

1. Recognize demographic risk factors for cannabis use
   Current literature highlights consistent demographic risk factors for cannabis use. Younger populations,[1-15] males,[1-11,15-19] and nicotine users[3-7,13-16] frequently show higher associations and comprise most cited risk factor groups across nearly 40% of the articles in this review. Psychiatric comorbidities like anxiety and depression,[1,4,7,10] substance use disorders,[1,4-5,8] and alcohol abuse further elevate risk across multiple studies.[8,14]

2. Assess for and evaluate frequency of cannabis use[20,21]
   The American Association of Nurse Anesthetists (AANA) notes that preoperative assessment for cannabis use is crucial to maintaining patient safety.[22] Using a combination of the latest aggregate data and expert panel consensus from the American Society for Regional Anesthesia (ASRA) it is recommended that patients should be asked a series of direct questions in a non-judgemental format and reinforce that safety is the number one priority.[20,21] It is important to note that this population is increasing and only recently has an evidenced based assessment tool been produced.[23]
   a. CUBAT tool questions (7)
      - 1. Have you used cannabis, in any form, within the last month?
        - Yes, no, prefer not to answer
      - 2. How often do you use cannabis?
        - frequency per day, week, month
      - 3. What are the primary ways you consume cannabis?
        - Inhaled (smoke/vape), oral (edibles/sublingual) , topical, other?
      - 4. When was the last time you used cannabis?
        - Within the last 6, 12, 24, week, month?
      - 5. Can you describe the concentration/contents of the cannabis you consume?
        - Percent THC/CBD, Mg per serving, G/oz of flower, other amount
      - 6. Are there any specific reasons you use cannabis? If so, what are they?
        - Anxiety, Nausea/vomiting, pain, lack of appetite, seizures, sleep aid, relaxation, recreation, cancer, other
      - Have you ever experienced a bad reaction/withdrawal from cannabis?
        - Bad reaction- experienced undesirable side effects, such as anxiety, paranoia, tachycardia, hallucinations, severe nausea, and vomiting, allergic reaction, difficulty breathing, or heart problems shortly after ingesting.
        - Withdrawal- experienced three or more of the following undesirable side effects within one week of abruptly stopping cannabis use: mood changes, irritability, sleeping problems, loss of appetite, or other physical symptoms, like headache, chills, abdominal pain
   b. Significant cannabis use definition[21]
      - Signficant Cannabis consumption for these recommendations would be described as greater than 1.5 g of inhaled cannabis per day and 300 mg

of CBD oil and 20 mg of THC oil. If inhaled cannabis content is unknown, then consuming a cannabis product more than two to three times per will be considered significant[21]

3. Counsel patients on risks of cannabis use[20]
   Several studies in the literature review noted higher postoperative pain scores in this population, as well as expert consensus utilizing grade A evidence.[4,9,20,24] Establishing realistic expectations in the preoperative phase should be a priority as well as getting an accurate assessment of cannabis use utilizing the CUBAT as a guide. Creating a nonjudgemental environment where patients feel willing to disclose this information is important. One common limitation of many of these studies is challenges surrounding self reporting bias and incomplete usage characteristics such as frequency, amount, last used, etc.

4. Consider taper if preop visit > 7 days[21]
   If able to wean 7 days or more prior to surgery then there is a possibility of reduction of adverse outcomes associated with significant cannabis use.[21] These include the negative effects on pain control, cannabis withdrawal syndrome, uncertainty of anesthetic depth on EEG (BiSpectral Index), and PONV.[21] If unable to wean over the course of 7 days or more it is not recommended to attempt the wean as it does not give the patient enough time to be outside the risk of developing perioperative cannabis withdrawal syndrome.[21]

5. Delay elective surgery if patient showing signs of acute intoxication or acute onset impairment of decision making related to cannabis intoxication.[20]
   Patient safety and informed consent are paramount to anesthesia care, a person who is intoxicated cannot be properly consented. Additionally, acute intoxication increases the risk for intraoperative bradycardia, hypotension, and MI.[20] No delay is recommended for chronic use without active intoxication or to taper.[20,21]

Intraoperative Recommendations

1. Consider increased level of anesthesia
   Multiple sources have confirmed that increased anesthetic doses are required for patients that use cannabis.[14,15,17,20,21,25-27] This recommendation can be further refined by confirming amounts and most recent consumption to quantify use patterns.[20]
   Identification of patients most likely to have high rate of consumption will prepare the anesthetist to use adequate doses for induction and maintenance, avoiding the sequela of light anesthesia. Consider multimodal strategies and processed EEG monitoring to improve anesthesia depth.[20,21]

2. Increase PONV prophylaxis[16,21]
   Significant cannabis represents an independent risk factor for postoperative nausea and vomiting. Studies have demonstrated that patients with high levels of cannabis use have increased risk for PONV and increased history of PONV.[16,21] The effect may be linked to dysfunctional CB1 receptors in the central and enteric nervous system.[21] Further,

increased prophylaxis may be advantageous in preventing hyperemesis syndrome and vomiting from cannabis withdrawal syndrome.[21]

3. Consider 5-lead ECG monitoring for patients with additional risk factors
   Cannabis use increases the risk for myocardial infarction.[5,8,28-31] This finding was noted in both the general population[28] and in surgical populations.[5,8,29-31] Using 5-lead monitoring enhances the success rate for detecting early myocardial ischemia, improving outcomes following perioperative MI.

4. Consider multimodal or regional anesthesia for pain management
   Patients who use significant amounts of cannabis rate pain higher than those who abstain from cannabis.[4,7,9,21,24] Using many strategies to combat operative and postoperative pain will improve satisfaction among patients. Current evidence suggests that there are no contraindications for any pain medications due to cannabis use.[21] Some studies suggest that P450 enzymes may be inhibited in significant cannabis use, necessitating longer dosing intervals if clinically indicated.[21]

5. Consider renoprotective strategies during anesthesia
   Multiple studies demonstrated an increased risk in acute kidney injury following surgery in patients that used cannabis.[3,6,18,29,30,32] The etiology for this finding is unclear. One study suggested that less blood pressure support is needed in these patients, which could result in lower fluid administration totals for these patients.[11]
   Delta-9-tetrahydrocannabinol, or THC, has been shown to cause vasoactive effects in peripheral vascular beds in animal models, representing a risk of renal artery constriction and hypoperfusion.[33] Further studies are needed to elucidate the reason for this phenomenon.

Postoperative Recommendations

1. Monitor for CWS signs and symptoms[20,21]
   47% of people who use cannabis regularly or show dependence experience withdrawal (cannabis withdrawal syndrome, CWS). More commonly this occurred in patients who also smoked tobacco and those who used higher levels of cannabis. CWS symptoms include nightmares, outbursts, irritation, trouble getting or staying asleep, tensing up, nausea, night sweats, depression, anxiety, mood swings, abdominal pain, and loss of appetite.[21] These symptoms can occur as early as 24 hours post-last dose, which may impact inpatient and outpatient recovery in patients that have abstained from cannabis products for their procedure.[21]

2. Consider early evaluation for neurological deficits (AHA increased CVA risk)
   Significant cannabis use increases the risk of vasoocclusive disease, including in the cerebral vasculature.[28] The AHA recognizes cannabis use as a risk factor for stroke.[28] In the event of new postoperative neurological deficits, prompt assessment and intervention is key to preventing disability related to cerebrovascular accidents.

3. Consider escalating postoperative analgesic doses
   Patients who use cannabis experience increased postoperative pain.[4,9,21,24] Providers should anticipate increased demands for pain medications postoperatively. This should be considered when planning for postoperative pain management.

4. Reinforce education on the risks of significant cannabis use and counsel cessation.
   Educating patients on their increased risks of comorbidities and complications enables the patient to make more informed decisions about their health and well-being. Continuing to provide a nonjudgemental environment keeps the conversation open and reinforces honest admittance to the usage of cannabis.

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